

AperTO - Archivio Istituzionale Open Access dell'Università di Torino

From ESKAPE to ESCAPE, From KPC to CCC.

This is the author's manuscript

Original Citation:

Availability:

This version is available <http://hdl.handle.net/2318/1508473> since 2017-08-30T17:15:44Z

Published version:

DOI:10.1093/cid/ciu1170

Terms of use:

Open Access

Anyone can freely access the full text of works made available as "Open Access". Works made available under a Creative Commons license can be used according to the terms and conditions of said license. Use of all other works requires consent of the right holder (author or publisher) if not exempted from copyright protection by the applicable law.

(Article begins on next page)



UNIVERSITÀ DEGLI STUDI DI TORINO

This is an author version of the contribution published on:

De Rosa FG, Corcione S, Pagani N, Di Perri G
From ESKAPE to ESCAPE, From KPC to CCC.
CLINICAL INFECTIOUS DISEASES (2015)
DOI: 10.1093/cid/ciu1170

The definitive version is available at:

<http://cid.oxfordjournals.org/lookup/doi/10.1093/cid/ciu1170>

From ESKAPE to ESCAPE, from KPC to CCC

Francesco G. De Rosa^{#*}, Silvia Corcione*, Nicole Pagani*,

Giovanni Di Perri*

*Department of Medical Sciences, Infectious Diseases, University of Turin, Amedeo di Savoia Hospital; Corso Svizzera 164, 10139 Turin.

Keywords: carbapenemases, KPC, *Candida*, *Clostridium difficile*, antimicrobial stewardship

Running title: From KPC to CCC

Address for Correspondence:

Francesco G. De Rosa, MD [# Corresponding Author]

Associate Professor, Infectious Diseases

Department of Medical Sciences,

University of Turin, Italy

Ospedale Amedeo di Savoia

Corso Svizzera 164, 10149 Turin

tel. +39 011 4393979

fax. +39 011 4393996

Dear Editor,

Colonization and infection due to multidrug resistant (MDR) bacteria is nowadays an important issue in nosocomial and health-care associated infections, as reported by several surveillance systems [1-2]. The spread of MDR microorganisms has been linked to asymptomatic carriage by the hands of health-care workers, contamination of hospital environment, colonization of the bowel, use and duration of antibiotic treatments. We are currently facing new microbiological, infection control and clinical issues and the epidemiologic variations observed in the last years highlighted the need of a change from the initial proposed acronym “ESKAPE”, where MDR *Klebsiella pneumoniae* was acknowledged, to “ESCAPE” where Enterobacteriaceae and *C. difficile* were included.

The gut microbiota regulates important physiological metabolic functions of the host and can be impaired during prolonged antibiotic treatments, becoming a significant reservoir of microorganisms with a nosocomial profile of antibiotic resistance. In *C. difficile* infections there is a clearly recognized causal role of a dysbiotic microbiota, suggesting that similar alterations may be favoring colonization by carbapenem-resistant *K. pneumoniae* (KPC-Kp) or an excessive intestinal growth by *Candida* spp., thus favoring *Candida* bloodstream infections. Indeed, there are reports of candidemia following *C. difficile* severe infections [3], and KPC-Kp bloodstream infections associated with candidemia [4]. Interestingly, in murine models of gastrointestinal candidiasis Cole et al. analyzed the impact of colonization of gastrointestinal mucosa, alterations of the normal integrity of the mucosal epithelium and impairment of mucosal immunity in the development of invasive candidiasis [5].

If these considerations are correct, the gastrointestinal tube is a well recognized key player as the main reservoir for human disease by *Candida* spp. and for epidemic dissemination of MDR

bacteria such as KPC-Kp and *C. difficile*. Accordingly, we propose that antimicrobial stewardship programs should start focusing on a “CCC” strategy, aiming at Carbapenemases-producing Enterobacteriaceae, *C. difficile* and *Candida* spp.

Amongst Enterobacteriaceae, carbapenemases are mainly seen in KPC-producing *K. pneumoniae*, with increasing data coming not only from critically ill and surgical patients but also from internal medicine wards [6]. The identification of patients colonized by KPC-Kp in different settings deserves a dedicated intervention and a major compliance of health-care workers to simple standard hygiene procedures, such as hand washing [7]. The European guidelines on infection control issues for Gram-negative bacteria highlight the scientific evidence available on prevention and isolation, including *C. difficile* [8].

The “CCC” acronym may help antimicrobial stewardship programs to focus on current issues and may guide physicians in remembering and acknowledging the importance of disturbances of the GI tract, including the collateral damage due to antibiotic treatment [9]. Timely identification of at-risk patients, early treatment in symptomatic patients, antibiotic de-escalation are urgently needed. Save the tube!

Funding: none

Transparency declaration: None to declare.

References

1. Weist K, Diaz Hogberg L. ECDC publishes 2013 surveillance data on antimicrobial resistance and antimicrobial consumption in Europe. *Euro Surveill* **2014**; 19(46).

2. Hawser SP, Badal RE, Bouchillon SK *et al.* Susceptibility of gram-negative aerobic bacilli from intra-abdominal pathogens to antimicrobial agents collected in the United States during 2011. *J Infect*, **2014**; 68(1): 71-76
3. Guastalegname M, Russo A, Falcone M, Giuliano S, Venditti M. Candidemia subsequent to severe infection due to *Clostridium difficile*: is there a link? *Clin Infect Dis*, **2013**; 57 (5): 772-774.
4. Papadimitriou-Olivgeris M, Spiliopoulou A, Fligou F *et al.* Association of KPC-producing *Klebsiella pneumoniae* colonization or infection with *Candida* isolation and selection of non-albicans species. *Diagn Microbiol Infect Dis*, **2014**; 80: 227-232.
5. Cole GT, Halawa AA, Anaissie EJ. The role of the gastrointestinal tract in hematogenous candidiasis: from the laboratory to the bedside. *Clin Infect Dis*, **1996**;22 Suppl 2:S73-88.
6. Corcione S, Cardellino CS, Calcagno A *et al.* Healthcare-associated *Klebsiella pneumoniae* carbapenemase producing *K. pneumoniae* bloodstream infection: the time has come. *Clin Infect Dis*, **2014**; 59(2):321-322.
7. Tacconelli E, Cataldo MA, Dancer SJ *et al.* ESCMID guidelines for the management of the infection control measures to reduce transmission of multidrug-resistant Gram-negative bacteria in hospitalized patients. *Clin Microbiol Infect*, **2014**; 20 Suppl 1:1-55.
8. Cohen SH, Gerding DN, Johnson S *et al.* Clinical practice guidelines for *Clostridium difficile* infection in adults: 2010 update by the society for healthcare epidemiology of America (SHEA) and the infectious diseases society of America (IDSA). *Infect Control Hosp Epidemiol*, **2010**;31(5):431-55
9. Paterson DL. "Collateral damage" from cephalosporin or quinolone antibiotic therapy. *Clin Infect Dis*, **2004**;38 Suppl 4:341-345.